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材料合成及性能

聚(2-甲氧基-5-辛氧基)对苯乙炔/单壁碳纳米管复合材料的光致发光特性

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摘要： 采用原位聚合法在无水四氢呋喃(THF)溶液中制备了聚(2-甲氧基-5-辛氧基)对苯乙炔(MOPPV)/单壁碳纳米管(SWNTs)复合材料。通过对该复合材料的红外光谱、X射线衍射、透射电镜、扫描电镜等的研究,证实SWNTs 已聚合到MOPPV上且被MOPPV紧密有效地包覆,形成了纳米线网状结构。通过紫外-可见(UV-Vis) 吸收光谱和光致发光(PL)谱发现:随着SWNTs掺杂量的增加,该复合材料的吸收强度逐渐增强且最大吸收峰出现红移,其发光强度呈现先升高后降低的趋势,发光峰蓝移。当SWNTs掺杂质量分数为3.85%时,复合材料的发光强度最大,此时最大发光峰位较纯MOPPV蓝移8 nm。研究结果表明:在MOPPV 中掺入一定量的SWNTs,能有效地增强复合材料的光致发光强度。

关键词： 复合材料 纳米线 光致发光 能量传递

Photoluminescence Properties of Poly(2-methoxy-5-octyloxy)1, 4-phenylenevinylene/Single-walled Carbon Nanotubes Composites

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Abstract: Poly(2-methoxy-5-octyloxy)1,4-phenylenevinylene(MOPPV)/single-walled carbon nanotubes (SWNTs) composites are prepared in anhydrous tetrahydrofuran(THF) solution by in-situ polymerization. The characteritics of MOPPV/SWNTs composites are investigated with infrared absorption spectroscopy, X-ray diffraction, transmission electron microscopy, and scanning electron microscopy. The results confirm that SWNTs are polymerized and closely cladded to MOPPV, forming the nanowire structure. The results of the UV-Vis absorption and photoluminescence spectra indicate that the absorption intensity of MOPPV/SWNTs composites is strengthened and the photoluminescence intensity firstly increases and then decreases with the increase of the contents of SWNTs, the red-shift of its absorption peak and the blue-shift of its emissive peak are observed with the increase of the contents of SWNTs. Especially, the highest photoluminescence intensity is obtained and the blue-shift of its emission peak is nearly 8 nm under 3.85% mass fraction of SWNTs. The results show that the doping of SWNTs can effectively enhance the photoluminescence intensity of MOPPV/SWNTs composites.

Keywords: composites nanowire photoluminescence energy transfer
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